

INSTITUTIONAL PARTNERSHIPS AND EPIDEMIOLOGICAL EVIDENCE REORIENTS POLICY AND STRENGTHENS HEALTH SYSTEMS TO IMPROVE INSTITUTIONAL DELIVERIES IN THE HILLY STATE OF HIMACHAL PRADESH – A COMMUNITY BASED TRANSLATIONAL RESEARCH EFFORT

VIDYA RAMACHANDRAN¹, NARENDRA K. BHARADWAJ², K. KANAGASABAI³,
P. MANICKAM⁴ & MANOJ V. MURHEKAR⁵

^{1,3,4,5} National Institute of Epidemiology, Chennai, Tamil Nadu, India

² Field Epidemiology Training Programme graduate of National Institute of Epidemiology,
Himachal Pradesh, India

ABSTRACT

Introduction: Despite India recording a 59% decline in maternal deaths in 2012 since 1990, wide inter state differentials in MMR have eluded achievement of MDG 5 by 2015. In the state of Himachal Pradesh (HP) MMR was 170/100, 000 live births (NFHS III). In 2007-2008 the state recorded an antenatal registration rate of only 31% and institutional delivery (ID) rate of 48%. The government of HP invited experts from National Institute of Epidemiology (NIE), Chennai and National Health Systems Resources Centre (NHSRC), New Delhi, to examine the problem and propose measures for improvement. The Expert team conducted a study in Himachal Pradesh to: (i) identify factors associated with low IDs in the state, (ii) recommend specific interventions based on evidence generated in (i), and (iii) assess the effect of actions initiated by Govt of HP in improving IDs.

Methods: Adopting quantitative and qualitative epidemiological techniques and a systems approach using a logic matrix, we assessed beneficiary and health system issues that could be associated with low institutional deliveries in 4 districts (Hamirpur, Sirmour, Solan and Bilaspur). To identify factors influencing low institutional deliveries, we estimated proportions, Odds Ratios, Adjusted Odds Ratios and 95% Confidence Intervals and analysed Health System data of HP to assess effectiveness of actions initiated by HP Government (based on our recommendations) in improving institutional deliveries.

Results: Key factors associated with low institutional deliveries include: (i) High cost of pregnancy and delivery services in govt health facilities compared to negligible cost of home delivery, (ii) Hilly terrain impeding access to health facilities, and (iii) Gaps in health facilities with respect to availability of supplies/equipments related to provision of RCH services. Recommendations proposed for improvement included: (i) Make all pregnancy & delivery related services in govt. Health facilities free of cost irrespective of financial status (ii) Establish EMRI 108 services in HP and make it available to pregnant women free of cost and (iii) Carry out a facility based gap analysis of all health facilities in the state with focus on RCH services. Govt of HP changed policy to render all pregnancy & delivery related services in govt. health facilities free of cost irrespective of financial status; Launched EMRI 108 services in HP and made it available to pregnant women free of cost and (iii) Instructed all District CMOs to conduct a facility based gap analysis of all health facilities in the state with focus on RCH services. After 15 months these actions resulted in: (i) improvement in institutional deliveries from 52% to 70%.

Conclusion: This study showcases how symbiotic institutional partnerships between national research(NIE) and advisory(NHSRC) institutes and state governments, combined with sound epidemiological evidence translates to policy change and health system strengthening that ultimately impacts positively on desired health outcomes - viz., improvements in institutional deliveries.

KEYWORDS: Epidemiological Evidence, Institutional Partnerships, Institutional Deliveries, EMRI 108, RCH Services

INTRODUCTION

Globally, an estimated 289 000 maternal deaths occurred in 2013 - a decline of 45% from 1990. The sub-Saharan Africa region alone accounted for 62% (179 000) of global deaths followed by Southern Asia at 24% (69 000). At the country level, two countries accounted for one third of all global maternal deaths viz.- India at 17% (50000) and Nigeria at 14% (40000).ⁱ

The global MMR in 2013 was 210 maternal deaths per 100 000 live births, down from 380 maternal deaths per 100 000 live births in 1990. The MMR in developing regions (230) was 14 times higher than in developed regions (16). Sub-Saharan Africa had the highest regional MMR (510). Of the remaining MDG developing regions, five had low MMR: Eastern Asia (33); Caucasus and Central Asia (39); Northern Africa (69); Western Asia (74); and Latin America and the Caribbean (85). Three had moderate MMR: South-eastern Asia (140); Southern Asia (190); and Oceania (190). The estimated lifetime risk for maternal mortality in high-income countries is 1 in 3400 compared to 1 in 52 in low-income countries.ⁱ

Countries with an MMR ≥ 100 in 1990 are categorized as 'on track' if their MMR has declined by at least 75% between 1990 and 2013. The 11 countries categorized as 'on track' are: Maldives (93%); Bhutan (87%); Cambodia (86%); Equatorial Guinea (81%); Lao People's Democratic Republic (80%); Romania (80%); Timor-Leste (78%); Cabo Verde (77%); Eritrea (77%); Nepal (76%); Rwanda (76%). While 63 countries are described as 'making progress', 13 countries have made 'insufficient progress'.ⁱ

In India, about 56,000 women each year are lost in childbirth, that's one every eight minutes. This accounts for 19 percent of global maternal deaths, 70 % of which are preventable. Major causes of death include: heavy bleeding (hemorrhage) and eclampsia (high blood pressure). The Maternal Mortality Ratio (MMR) of India has declined from 212 in 2007-2009 to 178 in 2010-2012.ⁱⁱ Sample Registration System (SRS) data indicates India has recorded a sharp decline of 45.6% in MMR from 327 in 1999-2001 to 178 in 2010-12. A fall of about 30% occurred during 2006-12. The decline in MMR from 1990 to 2012 is 59%. The decline has been most significant in EAG States & Assam from 308 to 257.

Among the Southern States, the decline has been from 127 to 105 and in the Other States from 149 to 127.ⁱⁱⁱ (Table 1). As per SRS 2010-12, among the major States, Maternal Mortality Ratio is lowest in Kerala (66) and highest in Assam (328). During 2010-12, the Maternal Mortality Ratio is higher than the national level estimate in the States of Bihar/ Jharkhand, Madhya Pradesh/Chattisgarh, Odisha, Rajasthan, Uttar Pradesh Uttarakhand and Assam.^{iv}

From an estimated MMR level of 437 per 100,000 live births in 1990, India was expected to reduce the MMR to 109 per 100,000 live births by 2015. At the above pace of decrease, India is likely to reach an MMR of 140 per 100,000 live births by 2015, falling short by 31 points.^{iv} The States which showed highest points of decline during 1999-2012 are Uttar Pradesh/ Uttarakhand (declined by 247 points), Rajasthan (declined by 246 points), Odisha (declined by 189 points),

Bihar/Jharkhand (declined by 181 points), Madhya Pradesh/ Chhattisgarh (declined by 177 points) whereas at all India level, the decline was 149 points. Thus, most of the States with highest level of MMR in 2010 -12, have shown maximum points of decline. As per the present status (2010-12), the States of Andhra Pradesh, Gujarat, Kerala, Tamil Nadu, Maharashtra, and West Bengal have achieved the all India MDG target for MMR. However, Assam, Haryana and Odisha, are likely to fall short of their State level targets by huge margins. The remaining States are likely to miss the targets by 18 to 52 points.^{iv}

A signatory to the UNDP/WHO's MDGs (2000), India is strongly committed to reducing maternal mortality. The launching of nationwide programmes such as Universal Immunization (UIP) in 1985, Child Survival and Safe Motherhood (CSSM) in 1994 and Reproductive and Child Health (RCH) I & II in 1997 and 2005 respectively, NRHM and Janani Suraksha Yojana in 2005, with consequent observed reductions in MMR from 437/100,000 live births in 1990 to 178/100,000 live births in 2012, bear testimony to this. Despite these efforts and significant reductions, India still has a long way to go to achieve MDG 5 (MMR less than 100/100,000 live births) by 2015.

As mentioned earlier, wide interstate differentials in MMR are observed in the country. Disparities in governance and political commitment, as well as inequities in socio- economic and health development among states seem to be important barriers to achieving MDGs. These differences urgently demand implementation of evidence based interventions that are focussed on improving specific maternal health outcomes. Interestingly even in some well developed states MMR appears to be high. The hilly state of Himachal Pradesh (HP) is one such an example where MMR was reported to be 170 / 100, 000 live births.^v Although the state has impressive health indicators, it appeared to be lagging behind in achieving the RCH- II goals of 100% Antenatal (AN) registrations and more than 80% institutional deliveries (ID). In 2007-2008 the state recorded an antenatal registration rate of only 31% and institutional delivery rate of 48 %.^{vi}

This slow pace in reaching the intended RCH goals has been a major concern among public health policy makers and programme managers in Himachal Pradesh. Recognising the need to develop evidence based strategies to improve ID in HP, state health authorities invited a team of experts from the National Institute of Epidemiology (NIE), Chennai and the National Health Systems Resources Center (NHSRC), New Delhi, to examine the problem and propose measures for improvement. The expert team from NIE and NHSRC along with FETP graduates from NIE, conducted a study (end May 2010) in the state of Himachal Pradesh to: (i) identify factors associated with low IDs in the state, (ii) recommend specific interventions based on evidence generated in (i), (iii) describe the actions initiated on the recommendations proposed and (iv) assess the effect of actions initiated in improving ID in the state.

STUDY SETTING

We conducted our study in 4 districts of Himachal Pradesh viz., Hamirpur, Solan, Bilaspur and Sirmour. (Figure.1). The state of Himachal Pradesh has a total population of 6,856,509, including 3,473,892 males and 3,382,617 females (Census, 2011). This is only 0.57 per cent of India's total population, recording a growth of 12.81 per cent. Total fertility rate (TFR) per woman is 1.8 which is one of the lowest in India. Himachal Pradesh has a literacy rate of 83.78 per cent and Sex ratio of 974/1000 males. These four study districts constitute around 28% of the state's population (Solan:8.41%, Sirmour:7.73%, Hamirpur:6.63%, Bilaspur 5.57%).^{vii}

We selected Hamirpur district because here we observed that inspite of high (82%) AN registrations, IDs were only 50% (HP state data). Using DLHS-II^{viii} and III survey data, we classified all the districts into three categories, viz. (i)

Districts that had registered an increase in institutional deliveries, (ii) Districts that registered no change and (iii) Districts that registered a decline in institutional deliveries. We randomly selected one district in each category viz., Solan, Sirmour, and Bilaspur from Category (i), (ii) and (iii) respectively.

METHODS

To Identify the Factors Associated with Low Institutional Deliveries

We reviewed the published literature and broadly classified factors associated with low institutional deliveries into two categories, i.e. beneficiary related and health system related. Using both qualitative and quantitative methods, we conducted Focus Group Discussions (FGDs) and a case control study to identify beneficiary related factors. To identify health system related factors, we adopted a systems approach, developed a logic matrix and conducted a cross sectional survey to assess the quality of health care provided to pregnant women at various levels of the health system in different study districts.

We conducted two FGDs sessions - one each at Civil Hospital, Paunta Sahib, in Sirmour district and PHC Namhol, in Bilaspur district. In each FGD session we included 15 eligible women who had experienced at least one pregnancy. The aim of the FGD sessions were to learn from the participants: (i) their antenatal experience: whether they had registered antenatally, the quality of care they received during AN checks, number of AN checks undergone, distance to the nearest health facility, mode of travel used, costs of travel and (ii) their delivery experience: place of previous delivery and reasons for it, quality of delivery care and cost if any of delivery.

We conducted an unmatched case control study in Hamirpur district. Cases were pregnant women who were antenatally registered but did not deliver in a health institution. Controls were pregnant women who were antenatally registered and who had delivered in a health institution. Using data from an earlier cross sectional study conducted by us in this district viz., the proportion of pregnant women living at a distance from the health facility beyond 5 kms were 30% among cases, an Odds Ratio of 2, 95% confidence interval, 80% power, and case control ratio 1:1, we estimated a sample size of 167. Assuming a 5% non response rate, actual sample size was 175. Using a line listing of antenatally registered pregnant women who had (controls) and had not (cases) delivered at health institutions in the entire district we randomly recruited 175 cases and 175 controls.

We conducted a cross sectional study and surveyed health facilities in 4 districts i.e. Hamirpur, Shimla, Sirmour, and Bilaspur. Based on the logic framework developed we examined input, process and output factors to assess the quality of health care provided in the health facilities during antenatal, intra partum and post natal period. In Hamirpur, we surveyed 30 health sub centers, 25 PHCs and 5 CHCs and interviewed 30 medical officers from FRUs/PHCS and 140 health workers from health sub centers. In districts Solan, Sirmour and Bilaspur we conducted a rapid survey and visited Civil Hospital(CH), Kandaghat and CHC Dharampur in Solan district, Civil Hospitals Sarahan and Paunta Sahib, and district hospital in Sirmour district and proposed 24x7 PHC at Namhol in Bilaspur district. In these facilities, we observed services offered, resources available using a checklist and held discussions with health functionaries including local anganwadi workers.

Based on the findings of the FGDs, case control study and health facility based gap analysis, we proposed recommendations to improve institutional deliveries in HP state. The Government of Himachal Pradesh (GoHP) promptly acted on our recommendations. We analysed the GoHP HMIS data on IDs before May 2010 and after May 2010 up to October 2011 in HP to assess the effect of the actions initiated by the GoHP.

We interviewed and collected information from cases and controls, using an interview schedule consisting of semi-structured questions on demographic characteristics, socioeconomic status and various risk factors. We collected information about health facilities with respect to adequacy/availability of infrastructure, equipments, supplies and staff using an observational checklist and the supportive supervision tool for assessing family friendly hospital initiatives in terms of inputs, process and outputs. We interviewed health care providers using an interview schedule consisting of semi structured questions to generate information on qualification, training in RCH, knowledge of RCH issues and safe obstetric practices. We obtained state and district wise HMIS data on IDs in HP before and after interventions.

Data Analysis

For the case control study we analyzed the data using Epi-info version 3.5.1 to calculate Odds Ratio with 95% confidence interval. We carried out multivariate analysis using logistic regression and computed Adjusted Odds Ratios at 95% Confidence levels. For the cross sectional study we estimated the proportion of: (i) health facilities with adequate equipment, staff and supplies.(ii) health care providers trained in RCH care,(iii) staff with correct knowledge regarding RCH services(iv) staff providing RCH services in accordance with programme recommendations. To assess effect of interventions initiated by GoHP on ID we calculated the percent change in IDs after intervention compared to that before intervention using the HMIS data of the GoHP at state and district level.

Human Subject Protection

Our study was approved by the Ethics committee of NIE. Data were collected by trained volunteers. All data collection instruments were pilot tested prior to administration. Informed consent was obtained from all study participants who were assured of confidentiality and their freedom not to participate if they do not wish to do so without any repercussions to their rights to any services from the system. The GoHP permitted and facilitated this study.

RESULTS

Identify Factors Associated with Low Institutional Deliveries in HP

A. Beneficiary Related Factors

FGDs in Two Districts (Nimoh & Bilaspur Districts)

We recruited between 10-15 antenatal women in the two districts. These women were aged between 20-34, mostly educated between middle and high school and around 1/3rd belonged to BPL class. Nearly 50% opted for home and 50% opted for institutional deliveries – very much in keeping with the state average.

The reasons given by women opting for home deliveries include: (i) Long distances required to travel to a PHC – the nearest PHC being around 2kms away. (ii) Low frequency of local public transport and the need to use private taxi during labour – which is expensive.(iii) In many PHCs where women went for antenatal checks there were no delivery facility. Hence for delivery they had to travel long distances to civil or district hospital - which were unfamiliar. (iv) Home environment was more familiar and presence of family members during delivery was both comforting and confidence boosting. (v) Cost of home delivery was practically nil as payment to the dai was optional and involved at best giving a small token in kind whereas cost of delivery in a hospital would be very high. (vi) The traditional dai – who often was an elderly family member, not only conducted the delivery but also provided post natal care for the mother and newborn for at

least 4 days after delivery. (vii) It is necessary to go to health facility for delivery only if there is a problem or complication.

Most of the women who opted for institutional deliveries did so because they experienced some problems like prolonged labour, premature rupture of membranes, etc. Only few of them said institutional delivery was safe for both mother and child even if there were no known complications. Although these women expressed their satisfaction regarding the care they received in the institution, many felt that they would have been more comfortable and less afraid if one of their family members were permitted to stay with them during delivery. Further many felt that the cost of delivery services were quite high in a government facility – ranging between Rs 1500- 3000 for a normal delivery to Rs 5000- 15000 for a caesarean section. All the women felt that at least medicines should be given at the hospital. They also said they have to travel quite far to deliver in a government health facility and cost of transport was quite high.

Case Control Studies – (Hamirpur District).

Profile of Study Subjects

We recruited a total of 350 study subjects (175 cases and 175 controls). Their mean age was 25 years (S.D. \pm 8.96) and median age was 24 years (range 19 to 37 years). Majority (95%) were Hindus, 4.4 % Muslims and 0.6% Sikhs. Scheduled caste (SC) population was 33% , Scheduled Tribe (ST) 5% , 8% from other back ward classes (OBC) and remaining (48%) from Forward caste. More than 85% mothers were home makers among both cases and controls. The median monthly family income was Rs 8000/-. (range from Rs 1000 to 9000).

Comparison of Study Subjects (Cases and Controls)

Details of cases and controls are profiled in Table 2. About 66% of cases are aged between 19 years to 26 years and (34%) above 26 years. Mean age was 25 years (SD: 3.04). Controls aged between 19 years to 26 years were 117 (66.7%). and above 26 years were (33.3%). Mean age was 25 years (SD 2.95).

Among cases Scheduled caste (SC) population was 81(46.2%), Scheduled Tribe (ST) 7.4%, other back ward classes (OBC) 15% and remaining 36.0% from Forward Castes. Scheduled caste (SC) population in control group was 40 (22.9%) Scheduled Tribe 7.4%, 14(8%) from other back ward classes (OBC) and remaining 114 (66.0%) from Forward Caste. Nearly 98% and 96% mothers were home makers among cases and controls respectively.

We considered several potential factors that could be associated with low IDs for univariate analysis and observed several of them to be significantly associated. (Table 3). On multivariate analysis several beneficiary related factors were found to be significantly associated with home deliveries in the district. These include: (i) socio economic factors - Low educational levels of women and their husbands, SC/ST/OBC Caste, Unemployed/ daily wage earner status of husbands, Nuclear families, Low family income – mean monthly income < Rs 5000/-. (ii) Antenatal experience: Less than 5 AN Checks, pregnant women not getting medicines during AN Checks, non availability of health personnel during AN Checks; (iii) Awareness Issues - Low awareness among mothers regarding the benefits of institutional deliveries and non exposure to media; (iv) Affordability factors - high cost of institutional deliveries (mean cost Rs. 3200/-) compared to home deliveries (mean cost Rs 1200) and (vii) Access Issues: dependence on government transport and its non availability just before delivery. (Table 4)

Through a systematic facility based gap analysis, we identified several health system factors (inputs, process, outputs,) in Hamirpur district that could possibly influence quality of care provided at the health facilities and which in turn could be responsible for women opting for home deliveries in the district. Our findings regarding inputs and process issues are described below.

Inputs: (i) *Shortage of doctors and health workers in PHCs and health subcenters.* 17 out of 25 PHCs had only one doctor and one had no doctor. Only 7 PHCs had medical officers as per sanctioned posts i.e. (2 / PHC). At sub center level, out of 152 only 65 had both health workers; 54 sub centers were without Male Health worker (MHW). Thirty sub centers were without Female Health Workers (FHWs). (ii) *Facility for conduct of caesarean sections:* Only district hospital had facilities to conduct caesarean sections – since blood bank facilities and specialists were available there. (iii) *Availability of IEC materials:* Supply to health facilities was irregular and hence camps were conducted irregularly and IEC leaflets distributed to mothers was also irregular (iv) *Training of staff:* All staff were trained for RCH care. (v) *Supplies and Equipment:* There was no shortage of drugs and other supplies in the PHCs, etc.

Process: (i) *Services provided during antenatal care:* All sub centers were providing basic RCH services, like immunization, AN registration and antenatal checks, providing medicines (iron, folic acids tabs) and post natal checkups and basic health care. Near about 5 to 10% of women were not availing these facilities either due to lack of awareness or some time due to non availability of health care providers at health facility. (ii) *Conduct of deliveries:* Only 10 PHCs were conducting deliveries. The other 15 PHCs were not conducting deliveries due to shortage of staff. Several staff were deputed from periphery to block level (FRU' or in district hospital). At FRUs and in some of the PHCs only normal deliveries were conducted. Emergency obstetric care service was available only at district hospital. BEMONC and CEMONC are yet to be operationalised in the district. (iii) *Cost of services:* Under Rogi Kalayan Samiti women were charged for various tests, conducting deliveries and indoor charges at PHCs, FRU and district level. (iv) *Attitude of Staff:* Was observed to be cordial and patient friendly.

Rapid Health Facility Based Survey in Three Districts (Solan, Sirmour and Bilaspur)

The findings from our rapid health facilities survey in the three districts suggest the following:

In both civil hospital Kandaghat (Solan) and 24x7 PHC at Namhol (Bilaspur) we observed serious gaps in availability of staff, equipments and supplies and drugs related to provision of pregnancy/ delivery services. Therefore very few deliveries were conducted. In Bilaspur, out of the total reported deliveries, nearly 50% (2884 out of 6632) were home deliveries. Among unreported deliveries we assumed that majority would be home deliveries. Further, while there are 33 level 2 institutions (BEmONC) centres Block PHCs, 24 hour PHCs, Civil hospitals) in Bilaspur, only 9 centres were offering delivery services.

We learnt from the health officials that pregnant women were charged for both antenatal and delivery services in accordance with the Rajiv Gandhi Rogi Kalyan Samithi (RGRKS) programme. However women belonging to BPL class were entitled to free care. Our discussion with the mothers who had home delivery informed that the expenditure was nil except for a small token gift for the Dai who conducted delivery. The mothers who had institutional delivery, on the other hand even for normal delivery, said they spent around Rs.3000/- to 5000/- by way out of pocket expenses in the Govt institution. Even BPL status women were charged if they did not bring their BPL cards. Many BPL women were unaware

that they were required to bring their BPL cards to get free services and hence ended up paying for services received.

The CHC in Dharampur (Solan) was adequately staffed and equipped. Despite this there were very few deliveries conducted here. The staff seemed reluctant to encourage women to deliver in their premises. This could be because of lack of confidence and / or experience in conducting deliveries among the newly trained / recruited staff. The civil hospitals in Sarahan and Paunta Sahib (Sirmour) were adequately staffed and equipped and were conducting deliveries. Here again user fees were levied as per the RGRKS programme. We also learnt that women who had to undergo ultra sonographic examination in these centres had to make a separate appointment. This meant an additional visit along with its additional cost of travel, treatment etc. To overcome this problem most women visited a private ultrasound test centre and ended up paying Rs 400 for each such visit.

In all the centres we visited we observed the staff to be cordial and caring towards pregnant women. However neither ASHAs nor ASHA substitutes were recruited nor BEmONC/ CEmONC centres established in any of the districts in the state at the time of our survey. The govt of HP had only recently prepared a list of designated 24 x7 PHCs that would provide round the clock delivery services. The District hospital in each district is the only institution that offers level 3 services (manned by Gynaecologist, Paediatrician, Anaesthetist, having a blood bank / storage centre and is offering Ceasearean services). Level 3 services are also offered by medical college hospitals in the districts where they are located.

Availability of Drugs in the institutions (level 2 and 3) is an issue. None of the institutions visited could give a list of drugs they were supposed to have. The indents are based on what is available at the district store. Procurement of drugs besides the State is by the Rajiv Gandhi Rogi Kalyan Samithi at various institutions starting from PHC to the Civil hospital. During our discussions, pregnant women mentioned that often they had to buy prescribed medicines from outside because the hospitals were unable to provide it. We learnt from the pregnant women that local public transport is quite infrequent and often they have to resort to private transport facility while coming for antenatal checks and especially during delivery. Though ambulance facility was available in the civil hospitals, patients had to pay for the same at specified government rates. The GVK EMRI 108 facility was not in operation in Himachal Pradesh at the time of our survey.

From the rapid survey in the three districts it was evident that the major beneficiary and health system related factors that could be associated with low institutional deliveries include: (i) High cost (direct and indirect) associated with institutional deliveries compared to practically nil cost associated with home deliveries. (ii) Hilly and harsh terrain and infrequent availability of public transport coupled with non availability of EMRI 108 services renders access to health facilities for delivery difficult. (iii) Wide gaps with respect to availability of staff, equipment, drugs and supplies at level 2 and 3 health institutions as well as non availability of BEmONC/ CEmONC facilities act as deterrents for women to opt to deliver in health facilities. (iv) Misconceptions among women that they should go to an institution for delivery only if there are complications. (v) General lack of awareness among women regarding the importance of institutional delivery in assuring safe motherhood and child survival.

Recommendations Proposed by Expert Team

Based on the results of the studies carried out in the 4 study districts we proposed the following recommendations in June 2010 to address three main issues viz., Affordability, Access and Assurance of Quality care to women during pregnancy, delivery and after delivery.

- **Increase Affordability:** The High cost associated with institutional deliveries even in government facilities appears to be an important determinant of low institutional deliveries in the state. Therefore we recommended that the GoHP should take a policy decision and immediately declare that all deliveries in govt institutions be conducted free of cost irrespective of financial status. In addition pregnant women should be given all support in terms of investigations, drugs, etc. absolutely free of cost.
- **Improve Access:** Since the terrain in HP is hilly and harsh and local transport facility inaccessible to pregnant women when they need it, access to a health facility for delivery is poor. To improve access to health facilities for pregnant women at the time of delivery, the GoHP should establish the EMRI 108 services in the entire state and make it available free of cost.
- **Assure Quality Care:** Since most of the peripheral health facilities lacked the necessary equipment for conducting deliveries, the GoHP should carry out a facility based gap analysis in the state and mobilise measures to strengthen these facilities at different levels of the health system and thus enable them conduct deliveries in a safe manner.

Actions Initiated by Go HP on Recommendations

Responding to the recommendations proposed by the expert team, the GoHP initiated the following actions:

- The GoHP changed its policy about charging for deliveries in govt health facilities and on 15th August, 2010, launched the “Matre seva yojana” which provides all services to a pregnant women deciding to deliver in a govt health facility totally free of cost irrespective of financial status of the woman
- To strengthen the facilities in peripheral health institutions to enable the staff conduct deliveries, the GoHP designated several PHCs as 24x7 facilities and also ordered a state wide facility based gap analysis in October – November 2010.
- To improve access to health institutions in the state for pregnant women and others in need of emergency care, the GoHP launched the “Atal swasthya seva yojana” i.e. the EMRI 108 services, throughout the state on 25th December, 2010.

EFFECT OF INTERVENTIONS IN IMPROVING INSTITUTIONAL DELIVERIES

Analysis of HMIS^{ix} data from GoHP clearly showed that the percent of institutional deliveries in HP had improved after the establishment of Matre seva yojana and EMRI 108 services in the state. In 2009 - 2010 institutional deliveries were only about 52.8%. By October 2011 IDs had increased to 70%.(Figs. 2 & 3). Inter District differentials in improvements in IDs were observed with District Kangra recording the highest increase in IDs (30%) and district Bilaspur the lowest. (8.3%). (Table 5). By April 2011, the EMRI 108 services reported that 21 % of the clients whom they transported were pregnant women in labour.

DISCUSSIONS

In this study using quantitative and qualitative methods as well as conventional and rapid epidemiological techniques combined with a systems approach and a logic framework, we have identified both beneficiary and health system related factors that could be associated with low institutional deliveries in Himachal Pradesh. Our findings are

consistent with similar studies in several Indian settings. Analysing 124385 women aged 15-49 years included in the NFHS 3 data set, Rakesh et al (2011)^x reported a dose response relationship of home deliveries and maternal education, viz., higher maternal education being associated with delivery in a private/public health facility.

Similarly in a study conducted in rural Punjab, Rajesh Garg et al (2010)^{xi} observed that 66% of the 1000 women surveyed delivered at home and that home delivery was significantly associated with older and less educated women. Analysis of DLHS 3 data by S. Mohanty, et. Al, (2013),^{xii} supports our study findings viz., that out of pocket expenses in a government health facility is about US\$ 39/- for a normal delivery, and more than 5 times in a private facility. For a cesarean section the amount is about US\$ 150/-.

Analysing DLHS 3 data, Pushpendra Kumar et al (2015)^{xiii} report very low utilisation of maternal health services among SC/ST women which is similar to our study findings. In a cross sectional survey of an urban poor settlement in Delhi, Niveditha et al (2014)^{xiv} observed on adjusted analyses that multi parity, low literacy, fear of hospitals, comfort of home, lack of social support for child care were key reasons for home deliveries. These findings endorse our study findings.

In a community based cross sectional study of 605 women selected from 28 villages in Thiruvavur district of Tamil Nadu, R.P.Ravi et al (2013)^{xv} reported, “having a distant health center, lack of transportation and financial constraints” as the main reasons for home delivery. In our study also we observed similar reasons for home deliveries.

An analyses of NFHS I^{xvi} & II^{xvii} data in four Indian states after controlling for other factors indicated that women who received antenatal checks were 2-5 times more likely to deliver in a health facility compared to women who did not receive an antenatal check up.(Sugathan et al. - 2001).^{xviii} Our study also reports similar findings.

The combined expertise of our study team members, our study findings and the very prompt and proactive actions initiated by the government of Himachal Pradesh on our recommendations with resultant positive health outcomes, very eloquently showcases the fact that strong and symbiotic partnerships forged between state governments and national level academic/research institutes (NIE) and national level health advisory institutes (NSHRC), and backed by sound epidemiological evidence, fosters a collaborative and cooperative spirit among all stakeholders and enables governments to take evidence based rational decisions to translate evidence to policy and strengthen health systems to achieve desired health outcomes – in this case improvements in institutional deliveries in the state of Himachal Pradesh. This collaborative study is one such an example - perhaps worthy of emulation by all states in the country to effectively improve their health indicators.

ACKNOWLEDGEMENTS

The authors of this study extend their grateful acknowledgements to:

- The NRHM Mission Director and the Principal Secretary Health, Government of Himachal Pradesh, for inviting our team, facilitating and funding this study and promptly translating the epidemiological evidence generated by our study to change policy, strengthen health system and consequently improve and achieve desired improvements in institutional deliveries in the state thus rendering this exercise an eloquent example of translational research and symbiotic partnerships.
- Dr. P. Padmanaban (late) and Mr Prashant Subramaniam of NSHRC for their technical support.

- All the FETP graduates and scholars who participated in this study.
- Dr. V. Kumaraswamy, former Director In-Charge, NIE, for facilitating this consultancy effort and study.
- Mr. S. Satish, Senior librarian, NIE for his valuable assistance in providing useful reference material.
- All the participants of this study (i.e. health care professionals functioning at different levels of the health system, Govt. of Himachal Pradesh, and the pregnant women who participated in the FGDs) for sparing their valuable time and active participation in the study.

Funding: This study was funded by the NRHM, Government of Himachal Pradesh. The funders were not involved in the design / conduct of this study.

Conflict of Interest: The authors declare that there is no conflict of interest in the conduct of this study.

REFERENCES

1. Trends in Maternal Mortality (1990-2013) UN/ WHO/UNICEF Report
2. Sample Registration System 2010-12
3. Registrar General of India- MMR Bulletin, 2013.
4. Millennium Development Goals. India Country Report 2014
5. National Family Health Survey III (2005-2006)
6. District Level Household Survey III (2008-2009) Report for Himachal Pradesh
7. Census of India Report (2011)
8. District Level Household Survey II (2004-2005) Report for Himachal Pradesh
9. Health Management Information Systems Data of Govt. of Himachal Pradesh – 2005-06 - October 2011
10. Rakesh Aggarwal, Amardeep Thind, (2011), “Effect of Maternal Education on Choice of location for delivery among Indian Women”. The National Medical Journal of India, Vol. 24, No6, pgs 328- 334.
12. Rajesh Garg, Deepti Shyamsunder, Tejbir Singh, Padma Avtar Singh (2010), “ Study on Delivery Practices Among Women in Rural Punjab”, Health and Population: Perspectives and Issues, vol. 33(1), 23-33.
14. Sanjay K. Mohanty and Akanksha Srivastava, (2013), “ Out-of- pocket expenditure on institutional delivery in India”. Health Policy and Planning, 28, 247-262.
16. Pushpendra Kumar and Abha Gupta. (2015), “Determinants of Inter and Intra Caste Differences in Utilisation of Maternal Health Care Services in India: Evidence from DLHS -3 Survey.” International Research Journal of Social Sciences, Vol. 4(1), 27-36. January.
17. Niveditha Devasenapathy, Mathew Sunil George, Suparna Ghosh Jerath, Archana Singh, Himanshu Negandhi,
18. Gursimran Alagh, Anuraj H. Shankar, (2014), “Why women choose to give birth at home: a situational

19. Analysis from urban slums of Delhi". BMJ open; 4:e004401. Accessed on 26th May, 2015.
20. Rejoice Puthuchira Ravi, and Ravishankar Athimulam Kulasekaran, (2013), World Applied Sciences Journal, 26(2): 282-288.
21. National Family Health Survey – I (1998-99).
22. National Family Health Survey –II (2002-2003).
23. K.S. Sugathan, Vinod Mishra and Robert D. Retherford, (2001), "National Family Health Survey Subject Reports, No 20.

APPENDICES

Table 1: Maternal Mortality Ratio (MMR), Maternal Mortality Rate and Life Time Risk; India, EAG & Assam, South and Other states, 2010-12

India & Major States	Sample Female Population	Live Births	Maternal Deaths	MMR	95% CI	Maternal Mortality Rate	Lifetime risk
INDIA TOTAL	6169091	430170	767	178	(166-191)	12.4	0.4%
Assam	195275	12811	42	328	(229-427)	21.5	0.8%
Bihar/Jharkhand	371114	38549	84	219	(172-266)	22.8	0.8%
Madhya Pradesh/Chhattisgarh	353851	32533	75	230	(178-282)	21.1	0.7%
Orissa	293129	19981	47	235	(168-302)	16.0	0.6%
Rajasthan	269335	26702	68	255	(194-315)	25.2	0.9%
Uttar Pradesh/Uttarakhand	542640	53194	156	292	(247-338)	28.7	1.0%
EAG AND ASSAM SUBTOTAL	2025344	183770	472	257	(234-280)	23.3	0.8%
Andhra Pradesh	357699	22427	25	110	(67-153)	6.9	0.2%
Karnataka	390941	21909	32	144	(94-194)	8.1	0.3%
Kerala	305268	15351	10	66	(25-106)	3.3	0.1%
Tamil Nadu	410769	22622	20	90	(51-130)	5.0	0.2%
SOUTH SUBTOTAL	1464677	82309	87	105	(83-128)	5.9	0.2%
Gujarat	301207	23552	29	122	(77-166)	9.5	0.3%
Haryana	179220	14243	21	146	(83-209)	11.6	0.4%
Maharashtra	342534	20684	18	87	(47-127)	5.2	0.2%
Punjab	206148	11988	19	155	(85-226)	9.0	0.3%
West Bengal	526090	29682	35	117	(78-156)	6.6	0.2%
Other	1123871	63942	87	136	(108-165)	7.8	0.3%
OTHER SUBTOTAL	2679070	164091	208	127	(110-144)	7.8	0.3%

Source: RGI MMR Bulletin 2013

Table 2: Profile of Cases and Controls – (Socio Demographic and Obstetric)

Socio -Demographic –Obstetric variables	Cases (175)	Control (175)
1. Age (mean)	25 years (SD±3.04)	25 years (SD±2.95)
2. Family Type		
Nuclear	52 (29.7%)	36 (20.6%)
Joint	123 (70.3%)	139 (79.4%)
3. Mean Family Income (per month)	Rs. 5702 (SD±6690.63)	Rs. 8635 (SD±10183.02)
4. Occupation of Mothers	98% House wives	97% House wives
5. Parity.		
One child	84 (48.0%)	89 (50.9%)
Two Child's	66 (37.7%)	69 (39.4%)
Three Child's	19 (10.2%)	15 (8.6%)
Four Child's	5 (2.9%)	1 (0.6%)
More than four child's	1 (0.6%)	1 (0.6%)

Table 3: Comparison of Potential Exposures among Cases and Controls - Univariate Analysis

Variables	Cases (n=175)		Controls (n=175)		OR	95% CI
	Exposed	Unexposed	Exposed	Unexposed		
1. Caste						
□ SC.ST.OBC	108	67	60	115	3.13	2.02- 4.85
2. Mother Education						
□ Up to middle	104	71	23	152	9.68	5.68 – 16.48
3. Husband Education						
□ Up to middle	54	121	7	168	10.71	4.71- 24.35
4. Husband Occupation						
□ unemployed	118	57	69	106	3.18	2.05- 5.00
5. Family type						
□ Nuclear	52	123	36	139	1.69	1.07 – 2.66
6. Monthly income						
□ < Rs 5000	133	42	101	73	2.28	1.50 – 4.00
7. No of checkups						
□ < 5	130	45	107	68	1.9	1.16 – 3.00
8. Receiving medicines during ANC						
□ No	42	133	10	165	5.21	2.51 – 10.77
9. Awaerness of where to go checkup for AN complications						
	128	47	24	151	17	9.93 -29.55
10. Media Exposure						
□ Yes	29	146	80	95	5.11	3.00 – 8.73
11. Dependence on Govt. transport during ANC						
□ Yes	38	137	8	167	9.44	4.21 – 21.14
12. Availability of Health care provider during ANC						
□ No	17	158	3	172	6.16	1.77 – 21.45
13. Examined by doctor during ANC						
□ No	169	6	103	72	19.68	8.26 – 47.00
14. Aware about the benefits of institutional deliveries						
□ No	16	159	2	173	8.7	2.00 – 39.00
15. Place of delivery of first child						
□ Home	131	44	11	164	44.38	22.00 – 89.34
16. Treatment taken during ANC for any complication						
□ Home.	21	154	4	171	5.82	2.00 – 17.35

Table 4: The Logistic Regression Coefficients Showing Adjusted Odds Ratio of Various Variables Associated with Low Institutional Deliveries among Antenatally Registered Pregnant Women District Hamirpur, Himachal Pradesh, India- 2010

Variables	Adjusted Odds Ratio (AOR)	(95% Confidence Interval)
1.Caste		
Backward castes SC, ST &OBC)	2.35	(1.43 – 3.90)
2.Mothers Education		
≤ M1ddle School	5.94	(3.20 – 11.06)
3.Father education		
≤ M1ddle School	10.71	(4.71 – 24.35)
4.Media Exposure		
No	7.0	(3.56 - 13.63)
5.During ANC for any complication treatment taken at		
Home	12.48	(6.56 – 23.75)
6. Dependence on Govt. transport facility during antenatal visits.		
Yes	4.5	(2.40 – 8.51)
7. Availability of health providers during antenatal visits.		
No	4.7	(1.04 - 20.99)
8. Examined by doctor during ANC		
No	18.32	(7.56 – 44.42)
9. Know the benefits of institutional deliveries?		
No	5.81	(1.31 – 25.85)

Table : 5 - Percent change in institutional deliveries in all districts of Himachal Pradesh (April 2005 – October 2011)

S. No	Districts	April 2005-2006	April 2009 – 2010	Percent Change	April 2009-2010	April-2011 October - 2011	Percent Change
1	Bilaspur	54.75	56.51	1.76	56.51	64.74	8.23
2	Chamba	24.3	32.75	8.45	32.75	44.48	11.73
3	Hamirpur	53.07	70.61	17.54	70.61	94.17	23.56
4	Kangra	44.61	41.61	-3	41.61	71.61	30
5	Kinnaur	39.20	40.33	1.13	40.33	53.97	13.64
6	Kullu	39.09	47.44	8.35	47.44	62.17	14.73
7	Lahol&Spiti	26.17	66.52	40.35	66.52	78.76	12.24
8	Mandi	32.63	40.50	7.87	40.50	55.40	14.9
9	Shimla	76.09	82.71	6.62	82.71	92.72	10.01
10	Sirmour	30.18	45.16	14.98	45.16	56.80	11.64
11	Solan	46.38	57.68	11.3	57.68	74.70	17.02
12	Una	36.14	55.85	19.71	55.85	71.20	15.35

Source: HMIS data of Govt of Himachal Pradesh. 2005-06-October 2011



Figure 1: Map of Himachal Pradesh

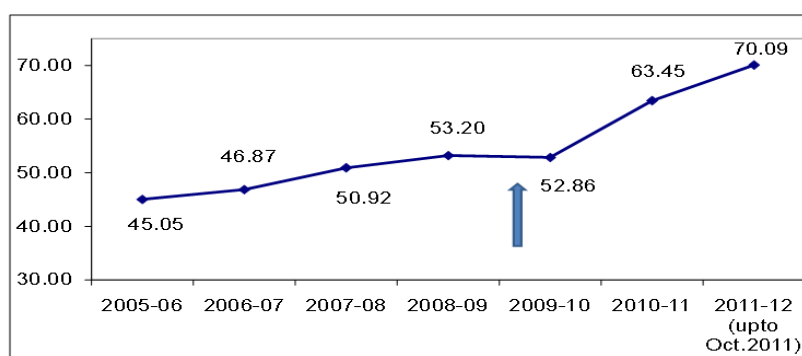
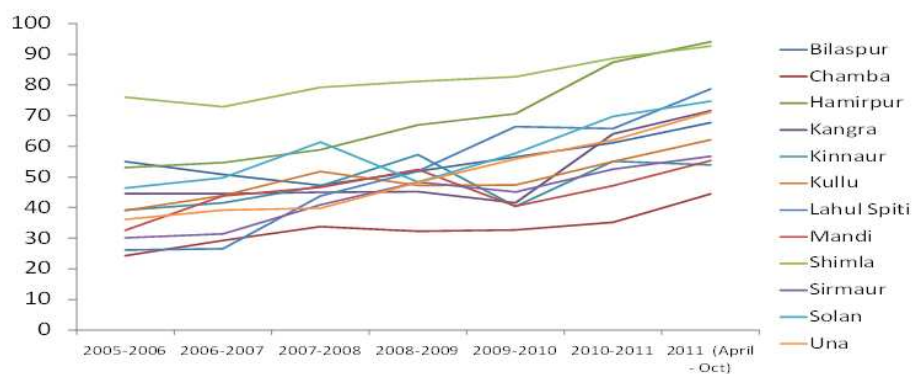


Figure 2: Trends in Institutional Deliveries in Himachal Pradesh 2005- 06 to October 2011



Source: HMIS data of Govt of Himachal Pradesh. 2005-06-October 2011

Figure 3: Trends in Institutional Deliveries by Districts in Himachal Pradesh – 2005- 06 October 2011

